NIST Security Measurement
NIST SP 800-55 Revision 1

Information Security and Privacy Advisory Board

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NIST SP 800-55 Rev 1 Overview

- Describes approach for development and implementation of ***information security measurement program*** to
  - Develop, select, and implement information system-level and program-level measures
  - Guide an organization on how to identify the adequacy of in-place security controls, policies, and procedures through the use of measures
- Provides an approach to help management decide where to invest in additional information security resources, identify and evaluate nonproductive security controls, and prioritize security controls for continuous monitoring
- Explains use of measures to adequately justify information security investments and support risk-based decisions

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Information Security Measurement Program Scope

- Information security measurement program scope can fit a variety of contexts
  - Quantifying information system-level security performance for an operational information system
  - Quantifying the integration of information security into the SDLC during information system and software development processes
  - Quantifying enterprise-wide information security performance
- Scope can encompass organizational units, sites, or other organizational constructs and be based on
  - Stakeholder needs
  - Strategic goals and objectives
  - Operating environments
  - Risk priorities
  - Information security program maturity

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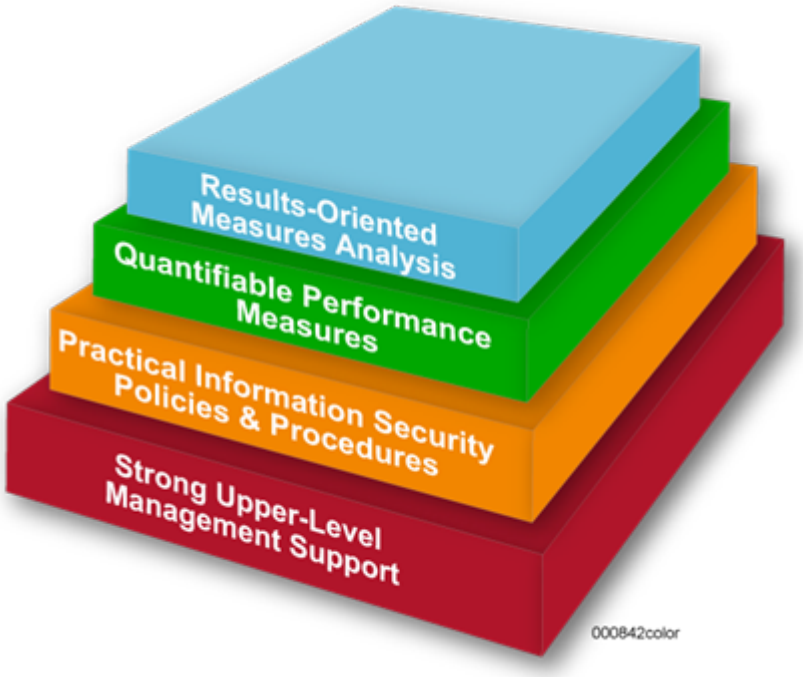
Information Security Measurement Program Structure



1. Foundation of upper-level management support is critical
2. Information Security Policies & Procedures must be backed by authority necessary to enforce compliance
3. Develop quantifiable performance measures to capture/provide meaningful performance data
4. Information security measurement program must emphasize consistent periodic analysis of the measures data

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Benefits of Using Measures

- **Increase Accountability**
  - Help identify security controls that are implemented incorrectly, are not implemented, or are ineffective
  - Facilitate identification of the personnel responsible for security controls implementation
- **Improve Information Security Effectiveness**
  - Quantify improvements in securing information systems
  - Demonstrate quantifiable progress in accomplishing strategic goals and objectives
  - Determine the effectiveness of implemented information security processes, procedures, and security controls
- **Demonstrate Compliance**
  - Assist in satisfying the annual FISMA reporting requirements
  - Use as input into GAO and IG audits
  - Demonstrate agency commitment to proactive information security
- **Provide Quantifiable Inputs for Resource Allocation Decisions**
  - Contribute quantifiable information to the risk management process
  - Allow measurement of successes and failures of past and current information security investments
  - Provide a solid baseline for business case development

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Relationship to Other NIST Documents

NIST SP 800-53A

NIST SP 800-30

NIST SP 800-53

Data Sources

NIST SP 800-55 Rev1

- Quantitative approach to measuring and analyzing security implementation and effectiveness aggregated across multiple individual efforts
- Approach for aggregating information efforts to obtain enterprise-level perspective
- Inputs into the information security program activities
- Inputs into prioritization for the continuous monitoring and improvement
- Supersedes 800-55 and Draft 800-80

Inputs

NIST SP 800-100

NIST SP 800-65

NIST SP 800-37

800-30, *Risk Management Guide for Information Technology Systems*

800-37, *Guide for the Security Certification and Accreditation of Federal Information Systems*

800-53, *Recommended Security Controls for Federal Information Systems*

800-53A, *Guide for Assessing the Security Controls in Federal Information Systems*

800-65, *Integrating Security into the Capital Planning and Investment Control Process*

800-100, *Information Security Handbook: A Guide for Managers*

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Types of Measures

- *Implementation* measures to track progress in implementing information security controls
  - Percentage of individuals screened before being granted access to organizational information and information systems
  - Percentage of employees who are authorized access to information systems only after they sign an acknowledgement that they have read and understood rules of behavior % of trained personnel
  - Percentage of information system security personnel that have received security training
- *Effectiveness/efficiency* measures to track results of security control implementation
  - Percentage of vulnerabilities remediated within organization-specified timeframes
  - Percentage of physical security incidents allowing unauthorized entry into facilities containing information systems
  - Percentage of remote access points used to gain unauthorized access
- *Impact* measures to articulate the impact of information security on the organization's mission
  - Cost of virus attacks
  - Cost of incident recovery
  - Cost of downtime

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Measures Template

Measure ID	Unique identifier used for measure tracking and sorting
Goal and Objective	Statement of information security goal and objective, may include strategic goal
Measure	Statement of measurement-use a numeric statement beginning with “percentage”, “number”, “frequency”, “average”, or similar term
Measure Type	Whether the measure is implementation, effectiveness/efficiency, or impact
Formula	Calculation to be performed that results in a numeric expression of a metric
Target	Threshold for a satisfactory rating for the measure, expressed in %, time, $, etc.
Implementation Evidence	Specific questions that will need to be answered via survey or through automatic data gathering to be able to calculate the metric
Frequency	How often the date is collected/analyzed, and how often the data is reported
Responsible Parties	Indicate the following key stakeholders: Information Owner, Information Collector, and Information Customer
Data Source	Lists the location of the data to be used in calculating the measure
Reporting Format	Indication of how the measure will be reported, e.g. pie chart, line chart, bar graph

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Example – System and Service Acquisition

Field	Data
Measure ID	Service Acquisition Contract Measure 1 (or a unique identifier to be filled out by the organization)
Goal and Objective	• *Strategic Goal:* Accelerate the development and use of an electronic information infrastructure • *Information Security Goal:* Ensure third party providers employ adequate security measures to protect information, applications, and/or services outsourced from the organization
Measure	Percentage (%) of system and service acquisition contracts that include security requirements and/or specifications NIST SP 800-53 Control – SA-4: Acquisitions
Measure Type	Implementation
Formula	(Number of system and service acquisition contracts that include security requirements and specifications/total number of system and service acquisition contracts) *100
Target	This should be a high percentage defined by the organization
Implementation Evidence	1. How many active service acquisition contracts does the organization have? _____ 2. How many active service acquisition contracts include security requirements and specifications (SA-4)? _____
Frequency	Collection Frequency: Organization-defined (example: quarterly) Reporting Frequency: Organization-defined (example: annually)
Responsible Parties	• Information Owner: Organization-defined (example: Contracting Officer) • Information Collector: Organization-defined (example: Contracting Officer's Technical Representative, System Owner) • Information Customer: Contracting Officer's Technical Representative, System Owner, Procurement Officer, Chief Information Officer (CIO), Information System Security Officer (ISSO), Senior Agency Information Security Officer (SAISO) (e.g., Chief Information Security Officer [CISO])
Data Source	Service acquisition contracts
Reporting Format	Pie chart comparing the percentage of system and service acquisition contracts that include security requirements and/or specifications versus the percentage of system and service acquisition contracts that do not include security requirements and/or specifications

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NIST 800-55 Revision 1 Summary

Revised	New	Remained

• Measures development methodology that ties into enterprise-wide strategic planning process
• Expanded measures implementation methodology with integrated continuous monitoring
• Measure development template
• Mapping to NIST SP 800-53 Rev1 controls
• Roles and responsibilities for consistency with FISMA and recent NIST publications
	• Expanded the guide to address enterprise-level measurement and measurement within the SDLC
	• Example information security measures addressing SDLC
	• Touch points with NIST Risk Management Framework
	• Overview of legislative and regulatory drivers (FISMA, GPRA, PMA)
	• Replaced ***metrics*** with ***measures***
	• Example measures consistent with the updated template
		• Focus on using measures to gain insight into information security
		• Importance of clearly defining and documenting the measures
		• Emphasis on use of measures to facilitate improvement of information security
		• Types of measures
		  • Implementation
		  • Effectiveness/Efficiency
		  • Impact

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Questions

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